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NEEDED EXTENSION IN MINERALOGIC INSTRUCTION*

Arthur S. Eakle, *University of California*

One who has been teaching mineralogy for a third of a century may be pardoned for presenting an address which deals with the subject from an educational standpoint, and contains little reference to mineralogy as a science. A teacher sometimes gets the notion that his particular subject is of the utmost importance, if not actually essential, in one's education and he sometimes makes his opinion manifest in our school curricula to the exclusion of subjects which might be more useful to the student in his later life. The proper and best education obtainable for our boys and girls during their elementary school training is the most important proposition we have to consider, and too much stress cannot be laid upon the necessity of a proper choice of subjects; and this choice should include studies best calculated to make the most intelligent and useful citizens. Special attention should be given in our lower grade schools to those subjects which cannot be readily learned from books and yet are a desirable part of one's education.

Mineralogy cannot be considered a subject either essential or of the utmost importance in one's life, but its desirability and usefulness must be conceded, and as an educational subject it stands unique and distinctive in that it gives to the student an insight into the related sciences, crystallography, chemistry, physics, geology, mining, and technical industries such as no other science does. It properly belongs in the list of subjects taught in the lower grade schools, and while the purport of this address is not to advocate the inclusion of a study of minerals as a necessary part of a school curriculum, my object is to point out to you that the gross ignorance which prevails about such common things as minerals is due largely to the fact of its absence and that no provision has ever been made to give the student even an insight into the science, and he finishes his schooling with his

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grammar or high school training and has never had an opportunity to know of minerals or acquire an interest in them.

Anyone who has a knowledge of minerals realizes how isolated he is with his knowledge, for it is rare to find a person in his district or town with whom he can talk about them. Those who know minerals or are interested enough to collect them are few and scattered. As much ignorance of minerals and crystals appears to exist to-day as it did centuries ago. There has been no action taken to remove this defect in our education and it is time something is done to stop perpetuating mineral ignorance, and begin a better dissemination of mineral knowledge.

The two statements: "I think that mineralogy must be a very interesting subject to study"; and, "I wish I knew something about minerals" have been made to me so often that I have taken them as the theme of this address to you. To many laymen minerals and wealth are synonymous, and they naturally think the subject is a very interesting one to study. As a science, however, those who delve just slightly into the subject may hold diversified opinions regarding its interest and only the mineralogist and advanced worker in the science can realize the absorbing interest, delight and profit obtained from a study of well crystallized specimens, since there are so many phases of the science one can follow, especially in the chemical and physical sides, and with the x-ray spectrograph and other instruments for crystallographic study.

But this address is not concerned with what mineralogy can offer the student nor with its development and growth as a science. It is the ignorance of the public regarding minerals, and the often expressed desire to know something about them, to which I wish to call your attention.

In olden times when it was impossible to know what the minerals were, complete ignorance of them was natural and unavoidable. Many of them became endowed with mystic, talismanic, healing, and protective powers, as a result of the prevailing superstition of the age. Today we can know with what we are dealing, and while few educated persons believe in the supernatural powers of stones, their belief is founded upon their general intelligence rather than upon a knowledge of the properties of the stone or mineral.

When we think of what minerals mean to us—that all life is dependent on them, that we live on a solid frame-work of them,

that we use them in our industries and in our daily vocations, that we even possess them and prize them as gems; it seems a most remarkable and unbelievable situation that so little is known and apparently so little interest is taken in our minerals. We have been content to accept as a matter of course the beautiful and useful minerals which nature has abundantly provided for our prosperity, without giving much thought to their kind or formation, or proper appreciation of them as inorganic bodies. The farmer may be interested in this globe to the depth of a few feet, and the miner, geologist and mineralogist may delve deeper, but the rest of mankind is interested only in the life and movement taking place on the surface of the earth.

There is a seeming apathy exhibited towards learning about the minerals, but this indifference is in fact non-existant. Ignorance of any subject will promote an apathy towards that subject and always work against a real active interest in disseminating a knowledge of it. I venture to say that the desire to know about minerals is almost as universal as is the wish to possess them as gems. This widespread desire often culminates in taking advantage of any opportunity which may come in later life to obtain instruction in mineral determination. As an illustration the Extension Division of the University of California offered a course in determinative mineralogy, and enrollments came from sixteen of our states, besides from Mexico, Alaska, and Hawaii, and inquiries from South America. Five of these enrollments were from New York state, and one from Massachusetts. They were of all ages from seventeen to sixty-five, and represented almost as many occupations as enrollments. Culture and advancement were the usual reasons cited for taking the course.

This goes to show that the lack of knowledge of minerals which so glaringly exists today is the result of circumstances which the individual could in no way change during his scholastic period. It is to the interest of all lovers of crystallography and mineralogy to do all they can to promote a wider knowledge of those subjects so that an elementary knowledge of them will not be for the specialist. The more interest manifested in any science, the more workers will there be in it, and it follows that more discoveries and greater advancement will result. We have a campaign of mineral education before us and our problem is how to conduct it.

Practically all instruction in mineralogy in this country, even of the most elementary kind, such as might be given in Nature work, has been relegated to colleges and other institutions of like grade. My long experience as a teacher has shown me that no valid reason exists for this delayed instruction, and it is the cause to a great extent of the present widespread ignorance of minerals. By this system of making elementary mineralogy a college course, ninety-eight percent of our boys and girls can never obtain instruction in the minerals, since statistics show that not more than two per cent of our population enter college. High school attendance is increasing and the percentage of students to population is much higher in some states than in others, yet the number who finish their high school course is small compared with the number who terminate their schooling at the end of the grammar grades.

Conceding that two per cent of our population might obtain instruction in the science in college, we know that only a small fraction of those who enter college would have the time or inclination to study mineralogy, so the few of us who have learned what a crystal is, are specialists. It is quite evident that if we wish to bring about a better and wider knowledge of minerals, instruction must begin in the lower grade schools, and not be relegated to the college as at present. A few excellent specimens of minerals to show beauty of form and color might well serve as object lessons to children to teach them observation and give them an insight in what nature can produce. It should be made possible for the high school student to obtain instruction in a knowledge of the more common and useful minerals, and such a course should be listed in their curricula as an elective or alternative course. Mineralogy teaches more than a knowledge of minerals. It gives the student a start and insight into those closely related sciences, mathematics, chemistry, physics, geology, and geography, and this fact should be weighed in making up the study list for the high school pupil. I am not asserting that crystallography or mineralogy are essential to know, or that they should be required subjects in any school or college, but I certainly believe they should be made possible studies for more than two per cent of our population. Furthermore, mineralogy is a fundamental subject to a knowledge of the earth sciences.

For most of us, training in mineralogy has begun and ended with the single elementary college course. This has been most

unfortunate for a dissemination of the science, and has had the effect of limiting the number who become mineralogists, and the amount of research work accomplished.

The physicist with his superior electrical and instrumental knowledge has devised instruments for important x-ray investigation of crystal structure and mineral composition, and has substantiated the "space-lattice" theory of internal molecular, or atomic, structure of crystals, and has been enabled to make important additions to our knowledge of crystal symmetry. We must look to our crystallographers and mineralogists to carry on in this work since it manifestly comes within their province; but there must be more of them to keep pace with our modern methods of investigation.

Since instruction in the two sciences, crystallography and mineralogy begins and ends with such a small quota of our population, it is essential for the growth and welfare of these sciences which our Society represents that instruction in them must be extended and naturally the best time in one's life to arouse interest in any subject is during one's school days, and extension of our elementary courses in mineralogy can take place only in our secondary and high schools. It is perhaps in the minds of some of you that chemistry is prerequisite for mineralogy. This is a great error and probably has had much to do with relegating the first courses in mineral study to college grade. Some of the ablest mineralogists began their preliminary training back in their early school days and gained much of their knowledge of chemical symbols and chemical reactions from a study of the minerals they collected.

I think most of you will agree with me that mineralogical instruction can be undertaken in the public schools with benefit to the student, and such instruction would go a long ways towards increasing a knowledge of minerals. Our problem to solve is to find a method by which such instruction can be introduced into these lower grade schools. Crystallography and mineralogy differ from many sciences in that little progress can be made in the study of either science from textbooks alone. One requires models to illustrate the forms and the other good representative collections of minerals for comparison and for determination, and no instruction can be offered where these are not available. The collections in our public museums attract the visitor more by the beauty of

the specimen than by names and properties of the minerals; but for the student of the subject and for the person who may have forgotten a large part of what he once knew of minerals, such collections are of great value and interest. Unfortunately these public collections are too few in number and usually only to be found in our larger cities and therefore are not available to many of the pupils in our schools.· The great majority of the youth of this land neither hear anything of minerals during their school life nor do they ever see a collection of them. It seems imperative that we should give some attention to the accomplishment of a wider knowledge of minerals than exists today, and three factors are involved to bring this about: namely, mineral collections, teachers and books.

Collections are essential. Steps should be taken to install mineral sets in our public schools, and especially in the high schools of our smaller cities and towns, where no public collections occur. Specimens of the more common minerals should be displayed sufficiently attractive to obtain the interest of the pupil. I think this a matter for the Society to look into and perhaps adopt some plan for a wider distribution of collections as the first step towards a wider interest in, and knowledge of, the minerals.

One of my friends who is a private collector and also a member of this society has arranged and installed a collection of the common minerals in the high school of his town, and there may be others of you who can do likewise. Well installed and labeled specimens showing fine crystallizations would stimulate a respect for the value of them and this would go a long way towards stopping the willful waste and destruction of good material so prevalent today by those ignorant of anything except the metallic contents. Minerals are learned better by constantly seeing them and there is no better place to have them installed than in the lower grade school where our boys and girls can at least have the opportunity to develop an interest in them. A more universal distribution of mineral collections will tend to overcome the great drawback which mineralogy suffers, namely, lack of specimens. Museum collections are necessary and are of great value to win the interest of the general public, but their educational value would be little compared to what it would be if the same material was part of our school equipment. Arouse the interest of the student in the

minerals before he visits the large collections, if value is to be obtained from such a visit. Too much stress can not be put upon this matter of providing the best examples of mineral specimens for our boys and girls to frequently see and thus become familiar with.

Minerals for identification should also be part of the equipment of the high school and all beginner's courses should be wholly practical requiring no book study. Lectures and textbook work can be relegated to the college.

Instruction in the subject requires capable teachers. Owing to the fact that nothing relating in any way to mineralogy is taught in our schools, there has never been a demand for teachers of the subject, consequently, our graduates of teachers' colleges have not included mineralogy in their curriculum. The few who elect mineralogy in their college course have no idea of ever teaching it and few of them ever do. Every high school should have a teacher capable of giving instruction in mineralogy in a beginner's course. but since there is at present little demand for such teachers it would be difficult to get Boards of Education to call for them; consequently a demand must first be created and this will necessarily result in a supply. If a widespread movement to install collections of minerals in our high schools is undertaken a demand for teachers of the subject will naturally follow.

The collection needs to be obtained before the teacher as the easier solution of how to get mineral instruction into our lower grades. Calling a man to teach mineralogy and letting him build up a collection is a policy for the college rather than for the high school. An abundance of good mineral specimens and the boy's and girl's desire to know about them will bring about a new order of things which will work a wonderful improvement in the knowledge and conception of minerals as the years go on.

We are dependent on books for most of our education. Teachers may direct our minds in the earlier years of our lives, but after schooling is over we must resort to books. Many sciences are readily understandable from a book study, but unfortunately for crystallography and mineralogy an actual contact with the specimen is necessary for identification purposes, and that is the usual first step in learning minerals. There are perhaps many persons who have a good general knowledge of the properties and uses of minerals and at the same time have practically no sight knowledge

of them. Such knowledge has been obtained wholly from books and mineral publications, and is of course a useful knowledge, but the ability to recognize the minerals should come first in mineral instruction. Our present types of books and publications are not designed for the general reader. The books on mineralogy are all of the stereotyped textbook style, dry and uninteresting to a layman and few students find them of much use let alone the general reader. There are interesting phases of crystallography and of mineralogy which could be written about in a readable manner, but the proper author has not appeared. It has been said that mineralogy cannot be popularized since it is such an exact science of facts, which are definite characteristics of the mineral and books descriptive of the minerals of necessity must be largely an enumeration of these facts and therefore dry and uninteresting. This statement seems to be borne out by the fact that in the list of one hundred books on scientific subjects written in a popular way so as to be available for the general reader, recommended by a committee appointed to prepare such a list, not one title on the subject of mineralogy is included. Ruskin may have gone to extremes to make the subject of crystallography understandable when he wrote his "Ethics of the Dust," and while his style of presenting the subject does not commend itself to the crystallographer, his book is, nevertheless readable, and has been read by many more persons than has any textbook on the subject. We need to cultivate a new style of writing for our textbooks both in mineralogy and crystallography, a style that presents the facts and theories in an interesting as well as in an instructive manner. Until this is done we cannot hope to see any of our books on the shelf of the home library, nor can we expect to see our sciences obtain or retain an equal place with other sciences, in the minds of the general public.

SUGGESTIONS CONCERNING THE USE OF SPECIES NAMES IN THE GARNET, AMPHIBOLE, PYROXENE, AND TOURMALINE GROUPS (ABSTRACT)

FRANK R. VAN HORN, *Case School of Applied Science*

For some years the writer has met with considerable difficulty in mineralogy classes because writers of many textbooks consider garnets, amphiboles, pyroxenes, and tourmalines as single mineral

species, each with several varieties or possibly sub-species, when they should really be regarded as isomorphous groups consisting of several species. Our idea of a variety is that there should be little if any difference in physical properties or chemical composition. For example, the varieties of quartz, among others, are rock crystal, amethyst, citrine, smoky, and rose quartz. In our opinion chalcedony is not a variety of quartz, but a separate species on account of its distinct optical properties. Varieties of corundum are ruby, sapphire, and emery, while varieties of gypsum are, selenite, alabaster, and satin spar. It is our general contention that there would be less confusion if the words, garnet, amphibole, pyroxene, and tourmaline were discarded as names of species, but retained for those of a group as in the case of micas and feldspars.

Garnet Group

The three members of this isomorphous group which are encountered most frequently are grossularite, almandite, and andradite, and it is our opinion that these are species just as distinctly as are albite, oligoclase and labradorite among the feldspars.

Amphibole Group

I think the general tendency among writers is to regard tremolite, actinolite, and hornblende as separate minerals. Although they will grade into each other as do all isomorphous minerals, it seems that they are as distinct as glaucophane, riebeckite, crocidolite, and arfvedsonite which are considered as separate species.

Pyroxene Group

Most writers distinguish diopside and augite as separate species of monoclinic pyroxenes. In our opinion too much is included under the term diopside, which contains both colorless and green varieties. Although all textbooks agree that diopside is $CaMg(SiO_3)_2$, nevertheless an inspection of analyses shows that most diopsides correspond to the actinolite molecule under the amphiboles rather than to the formula commonly given. The diopside which corresponds most nearly to the required formula seems to be the colorless one from De Kalb, St. Lawrence County, New York, which is given under analysis 8 in Dana's System of Mineralogy, page 359. For this species of pyroxene which corresponds most nearly to the tremolite from Campo Longo in the St. Gothard

region of Switzerland, I would suggest the name De Kalbite in order to preserve the name of the old St. Lawrence County locality. On this basis the diopside formula would be $Ca(Mg, Fe) (SiO_3)_2$ and would correspond, as it should, to actinolite in the amphibole group.

Tourmaline Group

Since most writers consider tourmaline as a single mineral and not an isomorphous group of several species, the writer has experienced more difficulty in teaching the tourmalines than any other group of minerals. It is true that all writers have distinguished between alkali, magnesia, and iron tourmalines as varieties, yet the differences in chemical composition, color, and probably other physical properties are presumably greater than between muscovite, lepidolite and biotite among the micas, or between the members of other isomorphous groups which are regarded as distinct species. The writer would like to see at least three species names used in the tourmaline group, and does not care particularly who names them or what they are called.

Although achroite and indicolite are also alkali tourmalines, nevertheless the pink mineral has such a wide distribution in lithium pegmatites that we suggest that rubellite be considered as a separate species. For the brown magnesia tourmaline, we suggest the name gouverneurite to perpetuate the name of the famous old St. Lawrence County, New York, locality. For the black iron tourmalines which are the most common of all, the writer suggested pierrepontite for the locality in St. Lawrence County, New York. Dr. Schaller has objected on the ground that this is a magnesia tourmaline. However, it depends on the definition of "iron" tourmaline which thus far has never been defined. As a matter of fact the magnesia is but slightly in excess of the iron, and one might argue that an iron tourmaline, by whatever name we wish to call it, is one which will contain enough iron to color it black. The one which has most iron, namely 17.40% FeO, is one quoted from Rammelsberg by Dana, (analysis 21, page 554) from St. Andreasberg in the Harz mountains. Dr. Wherry has pointed out that schorl or schorlite would have priority, and although we do not like the name, we are perfectly willing to accept it, as long as some definite name is assigned. Certainly rubellite, gouverneurite and schorl mean more and are subject to less confusion than the word "tourmaline."

MEMORIAL OF F. B. PECK*

A. Henry Fretz, *Easton, Pa.*

We record with regret the death of Professor Frederick Burritt Peck at his home in Easton, Pennsylvania, on November 2, 1925.

He was born at Seneca Castle (Phelphs), New York, on August 9, 1862, of New England ancestors who came as pioneer settlers to the Phelphs and Gorham Purchase.

He graduated from Amherst College in 1886 with the degree of A.B., electing studies in biology with the thought of studying medicine. His college course was interrupted by a year's absence due to the need of recuperation after an attack of typhoid fever.

He taught mathematics and science at Tillotson Academy, Trinidad, Colorado, 1886 to 1890 and was principal of the school 1890 to 1891. By applying his academic knowledge to geology while in Colorado he became devoted to this science and accomplished a considerable amount of practical work. He became Assistant Professor of Geology at Amherst in 1891 under Dr. B. K. Emerson. He lectured on geology at Amherst and Smith College during 1893–1894. After two years of study at the University of Munich under Dr. Paul Von Groth, he received the degree of Ph.D. In 1897 he was made head of the newly created Department of Geology at Lafayette College.

In 1898 Pardee Hall was destroyed by an incendiary fire. The immediate need of materials was filled by loans from Dr. Richards of Lehigh University and Dr. Kemp of Columbia. The present department stands as a monument of personal achievement to Professor Peck.

In 1901 he married Miss Cora Burr Horton of Binghamton, New York, by whom he is survived and a daughter Mary Gray Peck of the class of 1926 of Vassar College.

His chief publications included the "Crystallography of Bournite," *Z. Kryst.*, **27**, 1896, and measurements of heat conductivity on the same mineral incorporated in another article, and a Topographic and Geologic Survey of Pennsylvania, Report No. 5, which included descriptions of two distinctly different subjects, talc and serpentine of Northampton County, and the Portland

* Memorial read at the sixth annual meeting of The Mineralogical Society of America, New Haven, Conn., December 28, 1925.

cement materials of the Lehigh District with notes on the Cambrian basal conglomerate.

He was employed by the U. S. Geological Survey and did geologic mapping of the Carnegie quadrangle and prepared reports on coal in Indiana and Jefferson Counties, Pennsylvania. After resigning from the Survey he was retained by mining firms in Boston doing exploration and valuation work in Colorado, Arizona, Utah and Mexico. He also did private geological work locally on cement rock, slate and clay. His last active work related to the possibility of oil in western Alabama and the occurrences of natural resources during the World War. He visited the scene of the Messina earthquake immediately after the catastrophe and in addition to the collection of scientific data he took photographs which he used in a popular educational lecture.

In faculty matters he was a tactful debater and staunch advocate of the natural sciences. As a teacher he created an enduring interest in his particular subjects. He was a member of Delta Upsilon fraternity and active in the Lafayette Chapter. He has had the distinction of having the Melange (college year book) twice dedicated to him.

He was a wrestler while in college in the 135 pound class and enjoyed keenly vigorous outdoor exercise which added to his enthusiasm in geological trips in the Rocky Mountains and the Bad Lands while on expeditions for the University of Nebraska.

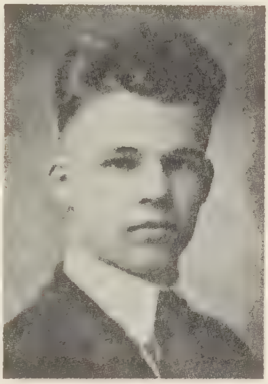
He was a member of many scientific societies. He was a man of much culture with appreciation of the best in music which was his great recreation while studying in Germany. Archaeology interested him from its artistic phase. His relaxation study was anthropology.

His social affability and scientific knowledge make his death a distinct loss.

MEMORIAL OF EDWARD FULLER HOLDEN*

EDWARD H. KRAUS, *University of Michigan*

While on a vacation trip with his family, parents, and friends, Edward Fuller Holden was drowned at North Deer Isle, Maine, August 5, 1925. In the tragic death of Dr. Holden the Department of Mineralogy of the University of Michigan lost a valuable member of its staff and the science of mineralogy an energetic investigator with unusual promise for splendid achievement. Dr. Holden is survived by his widow, Beatrice M. Holden, and three small sons.



EDWARD FULLER HOLDEN
1901—1925

Edward Fuller Holden was born at Woonsocket, Rhode Island, August 28, 1901, where his father, Amasa Amidon Holden, was principal of the high school. His mother, Mary Barnes Holden, is a direct descendant of Edward Fuller of the Mayflower group. Dr. Holden's early training was obtained in the schools of Woonsocket, and of York, Pennsylvania, where the family removed in 1913. After completing the high school course in the latter city, Dr. Holden entered the Pennsylvania State College in January, 1918, where he enrolled as a student of mining engineering. His unbounded energy and exceptional ability as a student permitted him to complete the high school and college courses in seven years. He received the degree of bachelor of science from the Pennsylvania State College in 1921. His advanced degrees were conferred by the University of Michigan, the degree of master of science in 1923 and that of doctor of philosophy in 1925.

At an early age Dr. Holden evidenced great interest in minerals which was stimulated by a course in general science pursued in the eighth grade. Throughout his high school course this enthusiasm developed to such an extent that before entering college he submitted for publication in THE AMERICAN MINERALOGIST a short paper on the occurrence of quartz crystals. As an undergraduate

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student Dr. Holden decided upon a career in mineralogy and accordingly chose his studies with that goal in view. His ability as an investigator now began to manifest itself, and by the time he received the baccalaureate degree he had prepared six papers on mineralogical topics which appeared in THE AMERICAN MINERALOGIST. From the autumn of 1921 until his death Dr. Holden held the position of instructor in mineralogy in the University of Michigan and during this period earned his graduate degrees.

While a student at the Pennsylvania State College Dr. Holden became interested in the cause of color in minerals, and to this problem he devoted much of his time at the University of Michigan, making notable contributions to its solution. His papers on the cause of color in rose quartz, smoky quartz, and amethyst established a new standard for publications in this field. Dr. Holden's thorough training in the various phases of mineralogy, and in chemistry and physics, permitted him to approach this problem from several standpoints as had not been the case with many of the earlier investigators of this subject. His paper on the pigmentation of amethyst was awarded the Walker prize for 1925 by the Boston Society of Natural History and was adjudged as being of unusual merit. Had Dr. Holden been spared to continue his researches he would have undoubtedly contributed much toward clarifying the perplexing problem of the cause of color in minerals. At the time of his death Dr. Holden had published sixteen papers and in addition had collaborated with the writer in the preparation of a textbook on Gems and Gem Materials which was published shortly after his death.

In 1921 Dr. Holden began abstracting papers on mineralogical and geological subjects for Chemical Abstracts and in 1922 became associate editor of that division of the journal. He also contributed numerous abstracts to THE AMERICAN MINERALOGIST and the REVUE DE GEOLOGIE. In all he prepared over twelve hundred abstracts for these publications, in addition to several book reviews. In 1923 he was also appointed associate editor of THE AMERICAN MINERALOGIST.

Dr. Holden attended the organization meeting of the Mineralogical Society of America in December, 1919, and became a charter member. In 1922 he was elected to fellowship in the Society. He was also a fellow of the American Association for the Advancement of Science and a member of the Michigan Academy of

Science, Arts and Letters and of the Junior Research Club of the University of Michigan. He also held membership in the Tau Beta Pi, Phi Kappa Phi, and Sigma Xi fraternities.

The intense scholarly activity and splendid scientific achievement of this short life of twenty-four years will remain an exceptional record in the history of American mineralogy.

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PROCEEDINGS OF THE SIXTH ANNUAL MEETING OF THE MINERALOGICAL SOCIETY OF AMERICA

FRANK R. VAN HORN, *Secretary*

The Mineralogical Society of America held its sixth annual meeting at Yale University, New Haven, Connecticut, on December 28, 29, and 30, 1925, in conjunction with the Geological Society of America. At 2 P.M. on Monday, December 28, a joint session was held with the Geological Society of America, at which the petrologic papers were read. At the close of this session, Professor Arthur S. Eakle of the Mineralogical Society gave his presidential address on "*Needed Extension in Mineralogic Instruction*". This paper is printed in full in this number.

On Tuesday, December 29 at 9 A.M. President Eakle called the regular annual meeting to order in Room 2 of the Sterling Chemistry Laboratory. On motion of the Secretary, the reading of the minutes of the last annual meeting was dispensed with in view of the fact that they have been printed on pages 61–68 of Volume 10, (Number 3) of THE AMERICAN MINERALOGIST.

ELECTION OF OFFICERS AND FELLOWS FOR 1926

The Secretary announced that 129 ballots had unanimously been cast for the officers as nominated by the Council. For fellows there were 66 votes in the affirmative for all except one man who received 65 votes. All officers and fellows as nominated were declared elected. It was also announced that there were 123 votes for the amendments to the By-Laws, and 6 votes in the negative. The amendments to the Constitution were carried by a vote of 64 to 2. These amendments were printed on pages 353–354 of Volume 10 of THE AMERICAN MINERALOGIST.

The officers elected for 1926 are the following:

Honorary President: Edward S. Dana, Yale University, New Haven, Connecticut,
President: Waldemar T. Schaller, United States Geological Survey, Washington. D. C.
Vice President: George Vaux, Jr., Bryn Mawr, Pennsylvania.
Secretary: Frank R. Van Horn, Case School of Applied Science, Cleveland, Ohio.
Treasurer: Alexander H. Phillips, Princeton University, Princeton, New Jersey.
Editor: Walter F. Hunt, University of Michigan, Ann Arbor, Michigan.
Councilor 1925–1929: W. A. Tarr, University of Missouri, Columbia, Missouri.

The list of fellows elected follows:

Charles Anderson, Sydney, Australia.
Arthur F. Buddington, Princeton, New Jersey.
Roy J. Colony, Columbia University, New York City.
Charles M. Farnham, Barre Plains, Massachusetts.
Robert B. Gage, Trenton, New Jersey.
Donnel F. Hewett, United States Geological Survey, Washington, D. C.
S. Kôzu, Tohoku Imperial University, Sendai, Japan.
J. Orcel, Museum d'Histoire Naturelle, Paris, France.
Clarence S. Ross, United States Geological Survey, Washington, D. C.
Frank C. Schrader, United States Geological Survey, Washington, D. C.
Edward S. Simpson, Perth, West Australia.
Manjiro Watanabe, Tohoku Imperial University, Sendai, Japan.

REPORT OF THE SECRETARY FOR 1925

The Secretary reports that the roll of the Society now comprises 108 fellows and 187 members, a gain of 11 fellows and a loss of 2 members for the year. Actually, between December 28, 1924 and December 28, 1925, 26 new members have been added, but most of these joined before the report of the annual meeting was published in March, and the Editor was very conscientious in bringing the Secretary's report up to date so that it would coincide with the published list of fellows and members. Several members have been dropped for non-payment of dues. Two fellows, Dr. Edw. F. Holden and Prof. F. B. Peck, and three members, V. W. Field, G. W. Fiss, and M. L. Glenn, have died. In addition to the 295 fellows and mem-

bers, there are also 114 subscribers, so that 409 paid copies of the *Journal* are mailed monthly. As usual it is requested that everyone make an effort to increase the number of members and subscribers.

Respectfully submitted,
FRANK R. VAN HORN, *Secretary*

REPORT OF THE TREASURER FOR 1925

The report was read by the Treasurer. On motion it was accepted and ordered filed. On motion, an auditing committee was appointed by the President, which consisted of Dr. E. T. Wherry and Dr. C. S. Ross. This committee later reported to the Secretary that they found the books of the Treasurer correct.

To the Council of the Mineralogical Society of America: The treasurer herewith submits his annual report for the year ending November 30, 1925.

RECEIPTS		
Cash on Hand, December 1, 1924		$ 251.56
Dues and subscriptions		1,392.08
Advertising		214.50
Sale of back numbers, etc.		82.04
Sale of Goldschmidt's Methods		7.00
Illustrations and Charges to Authors		448.68
Interest on bonds and bank deposits		41.21
Donation from Col. Washington Roebling		100.00
		$2,537.07
Bills Receivable		350.75
EXPENDITURES		
Printing the *Journal*		$2,087.48
Miscellaneous printing and stationery		82.55
Postage		33.51
For 9 volumes of THE MINERALOGIST (1–9 inclusive)		20.00
Miscellaneous		15.50
		$2,239.04
Balance in Princeton Bank & Trust Co.	$496.66	
Less checks Nos. 43, 44, 45, and 46, not returned on November 30	198.63	298.03
		$2,537.07

Respectfully submitted,
A. H. PHILLIPS, *Treasurer*

REPORT OF THE EDITOR FOR 1925

The report was read by the Editor and on motion it was accepted and ordered filed.

To the Council of the Mineralogical Society of America:

Two new records have been established by THE AMERICAN MINERALOGIST during the current year. These records refer to the number of original articles

published and to the size of the journal. This was accomplished mainly through the publication of two large issues which appeared in September and November. In each of these special numbers, which greatly exceeded the average size of a normal issue, the major portion of the expense was borne by the institution where the work was carried on, the Society paying only a fractional part which did not in either case exceed the cost of a regular number. All the members were thus enabled to secure two unusual publications, both from the standpoint of quantity and quality, without an additional burden being placed upon the Society. The favorable comments received from all quarters on the character of these special numbers has unquestionably confirmed the opinion of the Council in authorizing such a venture.

One of the weaknesses of our journal has always been our inability to accept lengthy manuscripts because of our limited resources. In the special numbers, however, it was possible to include a number of rather extensive investigations that ordinarily could not have been accepted and therefore would have been lost to our journal entirely.

The same privilege of using an entire issue of the journal is likewise extended to other institutions provided, of course, that the articles are suitable and the support sufficient so as not to place undue burdens upon our treasurer. It is hoped that since the precedent has now been established others may from time to time avail themselves of this privilege.

The current volume contains 57 leading articles or an average of nearly five per month and represents investigations carried on in twenty-three Universities and research bureaus, indicating clearly the rather extensive service rendered by the journal in serving as an outlet for mineralogical research. The present volume contains 448 pages of text proper, which compared with the 245 pages of the preceding year indicates an increase of 203 pages or nearly 83 per cent over last year—an increase over twice as large as the three previous years combined. The 57 leading articles occupied 383 pages of text while the 11 book reviews, 22 proceedings of societies, 38 abstracted accounts of new minerals and other items of general interest filled the remaining 65 pages.

The current volume is also characterized by a very liberal use of illustrations as is indicated by the 80 figures and halftones as compared with 61 of the preceding year. In many instances, especially where numerous cuts were involved, the author or institution fostering the research assisted in defraying the cost of these reproductions.

The concluding table of contents summarizes the distribution of subject matter in volume 10.

Distribution of Subject Matter in Volume 10

Subjects	*Articles*	*Pages*	*Per cent of total*
Original articles	57	382⅔	85.4
Proceedings of societies	22	29⅓	
Notes and news	57	8⅔	
Book reviews	11	4½	14.6
Abstracted accounts of new minerals	38	16½	
Abstracts	32	6⅓	
Total of text	217	448	100.0

Illustrations........................	80	
Covers, advertisements, index.........		92
Total............................		540

Respectfully submitted,
WALTER F. HUNT, *Editor*

REPORT OF THE COMMITTEE ON NOMENCLATURE AND CLASSIFICATION OF MINERALS

The Chairman, Dr. H. S. Washington, reported that on account of his absence from the country, the committee had held no meetings during the past year. He suggested that certain members of our committee might be able to hold a meeting with mineralogists from abroad at the coming International Geological Congress to be held at Madrid the latter part of May. Dr. E. T. Wherry, a member of the committee, presented three resolutions relating to mineral names which were referred to the Committee by the President.

NEW BUSINESS

Dr. W. T. Schaller moved that a committee of five be appointed to discuss the feasibility of having a depository at one or more places, at which authors describing new mineral species would be requested to send type specimens for future comparison. This motion was seconded and carried, and the President appointed as members of the Committee, W. T. Schaller, W. F. Foshag, H. P. Whitlock, A. N. Winchell, and A. L. Parsons. Dr. W. T. Schaller, the incoming President, called attention to the fact that just twenty-five years ago he had been a student at the University of California, of the retiring President, Professor A. S. Eakle, and spoke of the respect and esteem which he and all former students had for Professor Eakle.

MEMORIAL BIOGRAPHIES

A memorial sketch of Professor F. B. Peck, written by A. Henry Fretz, was read by Professor Frank R. Van Horn, and a biography of Dr. Edw. F. Holden was given by Professor E. H. Kraus. These are printed in full in this number of THE AMERICAN MINERALOGIST.

PRESENTATION OF PAPERS

There being no further business, the Society proceeded to the reading of scientific papers. The papers presented with short abstracts follow:

EDGAR T. WHERRY: *The Dimensions of Oxygen Atoms in Crystals.* Two entirely different values have been assigned to the radius of oxygen atoms in crystals, 0.65×10^{-8} cm (Bragg) and 1.19×10^{-8} cm (Davey). Both estimates were arrived at by a complicated series of calculations, into which errors may have entered. Accordingly a differential method has been used, based on as few assumptions as practicable. It is thought that the value obtained from Ni-Ni and Ni-O represents a *minimum*; it is 0.84. The value obtained from Ag-Ag, AgCl and Ag_2O may represent a *maximum*; it is also 0.84. Accordingly the radius of oxygen in crystals is concluded to be 0.84×10^{-8} cm.

ALBERT B. PECK: *The Informational Type of Examination as Applied to Large Classes in Mineralogy.* A brief comparison is made of the advantages and dis-

advantages of oral, essay, and informational types of examinations. The types of questions used (plus and minus, completion of a statement, and underscored word), were discussed and illustrated, together with mistakes to be avoided in their statement and arrangement. The system of grading employed to penalize guessing, and the advantages of this type of examination over the essay type were discussed.

ALBERT B. PECK: *The Time Factor in the Formation of Some Artificial Minerals.* Some artificial mineral deposits formed under rather accurately known conditions of temperature and time in a high-temperature commercial ceramic kiln were described. These include silica glass formed at about 500°C, hematite pseudomorphs after magnetite formed at about 850°C, some artificial lithophysae-like formations composed of cristobalite, changes in the constitution of silica brick, and the oxidation of silcon carbide to cristobalite at temperatures of about 600°C. The probable causes of the formation of these deposits were discussed, pneumatolysis probably being a very prominent factor in most cases.

A. N. WINCHELL: *Chlorite as a Polycomponent System.* Evidence was presented to show that chlorite is a polycomponent system of six or seven important molecules, but in most cases crystals consist of only four molecules ($H_4Mg_3Si_2O_9$, $H_4Fe_3Si_2O_9$, $H_4Mg_2Al_2SiO_9$, and $H_4Fe_2Al_2SiO_9$), with or without small to trifling amounts of other molecules. Points on a square may be used to represent the analyses and their relationships; on the same square the optic properties may be indicated by appropriate lines, since the optic properties depend directly upon the variations in composition. The optic properties of jenkinsite are those which were predicted by the diagram. A new classification of the chlorite system was suggested. In order to show the relations in composition of the six-component system a three-dimensional model is necessary; it is a triangular prism. It was suggested that there may be a real or apparent change in the state of oxidation of iron in ferriferous chlorites without destroying the crystals.

WILBUR G. FOYE: *The Occurrence of Thulite at Haddam, Connecticut.* Few occurrences of the mineral thulite have been described in the United States. The occurrence at Haddam is associated with the contact of pegmatite dikes with calcareous sandstones belonging to the Middletown series. Epidote crystals from Haddam are quite well known. They occur under similar circumstances and within a half mile of Walkley Hill where the thulite is found.

SAMUEL G. GORDON: *An Account of a Recent Trip to Bolivia and Chile.* Mr. Gordon gave a very interesting illustrated talk on his trip to Bolivia and Chile taken last summer. He spent some time visiting the tin mines at Oruro.

SAMUEL G. GORDON: *Penroseite and Trudellite, Two New Minerals.* An abstract of this paper appeared in the February issue of THE AMERICAN MINERALOGIST (see page 42).

A. C. HAWKINS: *Notes on Celestite and Pyrite from Rochester, New York.* CELESTITE: Yellow tabular crystal from Barge Canal on west side of city is flattened parallel to base (*c*), and shows the following forms: (001), (010), (101), (011), (110), (124). White prismatic crystals from Brighton on east side of city are flattened parallel to macropinacoid (*a*) and show forms as follows: (110), (100), and a termination of domes and pyramid largely destroyed by etching and solution. PYRITE: Crystals 1 mm in size implanted on yellow dolomite from Brighton on east side of Rochester are found to have uniformly the simple dodecahedral form, in one or two cases very slightly modified by the octahedron. The crystals appear

black because changed to limonite on the exterior, but are bright brass yellow when broken.

A. C. HAWKINS: *Directional Sensitiveness in Radio Crystal Detectors.* The writer has long thought that there should be a difference in sensitiveness in natural crystal detectors in different directions along the molecular structure of the crystal. Accordingly, as many natural crystals of the detector minerals as could be used for the purpose were subjected to tests on the crystal set. It was found that with the "cat-whisker" on the natural faces, pyrite crystals from Tucson, Arizona, gave the following general results: octahedron, good; cube, fair; pyritohedrons, poor. The difference in cube and octahedron faces is also markedly strong in pyrite from other localities, the octahedron always being the better. Galena from Mineral Point, Wisconsin, in cubo-octahedrons, is also an excellent detector, even in dull, etched crystals; the octahedron faces in this case also are found to give much better results than those of the cube.

J. F. SCHAIRER: *Lithiophilite and Other Rare Phosphates from Portland, Connecticut.* Lithiophilite and other rare phosphates have been found at the Collins Hill Quarry, Portland, Connecticut. The lithiophilite has been studied chemically, and the other phosphates identified optically. The minerals occur with spodumene, lepidolite, quartz and feldspar.

* * * *

At 1 P. M. the Society adjourned for lunch, and to spend the afternoon attending the dedication of the new Peabody Museum. After the formal exercises, the Museum was open for inspection.

On Wednesday, December 30, at 9 A.M. President Eakle called the second session of the Society to order. He announced that the Council by virtue of the power given to it by the amendments to the Constitution recently adopted, had elected Dr. Edward S. Dana as Honorary President of the Mineralogical Society of America to serve for life. Later in the morning, when Professor Dana appeared to attend the meeting, the Society arose to receive him, after which he expressed a few words of appreciation of the action of the Society in electing him Honorary President.

The reading of scientific papers then proceeded according to program.

LLOYD W. FISHER: *Applications of Colloid Chemistry to Mineralogy (Preliminary Report):* Attention was called to some of the more recent developments in the field of colloid chemistry and their bearing on mineralogy. Some of these results may be of considerable value in connection with the theories of crystal structure and in other respects. The apparent value of such investigations has not been stressed, i.e., instances of formation of crystals in colloid media, banding phenomena, and chemical reactions in gels. Results of a preliminary series of experiments were reported upon showing the usefulness of this line of attack, the experimental technique developed and difficulties encountered.

T. L. WALKER AND A. L. PARSONS: *Minerals from the New Nephelite Syenite Area on French River, Ontario.* An examination was made of certain minerals occurring in the nephelite syenite area recently discovered by Professor T. T. Quirke while on field work for the Geological Survey of Canada. From nodular masses 6 inches to 24 inches in diameter occurring in the gneissoid syenite, the writers have collected and studied cancrinite, sodalite, zircon, nephelite, magnetite, acmite and biotite. The cancrinite occurs in brilliant yellowish masses several inches in

diameter and is often surrounded by an alteration product salmon to flesh red in color which is shown by optical and chemical methods to be hydronephelite.

T. L. Walker and A. L. Parsons: *Zeolites and Related Minerals from Lake Nipigon, Ontario.* An examination of the minerals found in cracks and fissures in the Keewenawan traps of the southeastern shores of Lake Nipigon, Ontario.

T. L. Walker: *Oxidation of Arsenides of Cobalt, Nickel, and Iron.* Quantitative measurements of the rate of oxidation for several arsenides of cobalt, nickel and iron were given with chemical analyses indicating the products resulting from the change.

A. L. Parsons: *Additional Data Concerning the Preservation of Minerals.* Data in regard to causes of alteration of minerals supplementing the writer's paper (*Am. Min.*, **7**, 59–63) with suggestions as to means of preventing change.

Frank R. Van Horn: *Suggestions Concerning Use of Species Names in the Garnet, Amphibole, Pyroxene and Tourmaline Groups.* An extensive abstract of this paper is published as a separate article in this number.

Frank L. Hess and W. F. Foshag: *Carnotite from Colorado; and Rossite, a New Calcium Vanadate from Utah.* Carnotite, collected at Cave Spring Pass, near Moab, Utah, consisted of coarse platy crusts up to 2 mm in thickness on sandstone. Analysis of the carnotite gave the formula $K_2O.\ 2UO_3.\ V_2O_5.\ \frac{2}{3}H_2O$. The mineral is biaxial, $2V=50°$. $\alpha=2.06$, $\gamma=2.08$. A new calcium vanadate, collected on Wm. O'Niell's claim, Bull Pen Canyon, Colorado, near Summit Point, Utah, proved to have the chemical composition $CaO.\ V_2O_5.\ 2\text{–}4\ H_2O$. It is triclinic in crystallization. This mineral has been called rossite, in honor of Dr. C. S. Ross of the U. S. Geological Survey.

A. N. Winchell: *Doubtful Species as Illustrated by "Faroelite."* Isomorphous variations in composition are so common in silicate minerals that they should be expected in all cases. Therefore the formulas of such minerals derived from one or even from a few analyses are apt to be misleading. The X-ray pattern of "faroelite" is almost indistinguishable from that of ordinary thomsonite, but differs distinctly from that of natrolite. It is therefore clear that thomsonite and natrolite do not belong to a single isomorphous series, and very probable that "faroelite" and thomsonite do belong to such a series.

W. T. Schaller: *Origin of Pegmatite Minerals.* The minerals now found in ordinary pegmatite dikes are, to a large extent, not the original ones solidified from a magma, but are later hydrothermal replacements of the first formed ones. The original minerals of the intruded igneous dikes were only the feldspars and possibly quartz. A potash feldspar, probably orthoclase, was the chief mineral constituent of the original dikes. All the other minerals, micas, tourmalines, garnets, lithium minerals, phosphates, sulphides, etc., most of the albite, most of the quartz, and considerable microcline, are later hydrothermal replacements of the first formed dike rock.

W. T. Schaller: *Origin of Graphic Granite.* Both field and laboratory study suggest that graphic granite is the result of later quartz entering and partially replacing microcline. All stages from quartz-free microcline to the average graphic granite can be seen. Much of the quartz of graphic granite is directly connected with clearly later replacing quartz masses. Most of the quartz of graphic granite follows a crystallographic direction of the microcline—commonly a cleavage plane.

The shape and orientation of the quartz suggest that its position is the resultant compromise of the effects of crystal forces of both the microcline and the quartz.

Ernest E. Fairbanks: *Opacity*. (Read by title.) Most of the opaque minerals possess a metallic or a submetallic luster and are distinguished by the following physical properties: high electrical and good heat conductivity, high reflective power and very slight permeability to light. In the practical identification of the metallic or submetallic minerals (most ore minerals) no scheme is perfect but a combination of methods yields very satisfactory results. Quantitative data are difficult to obtain especially in polished ore section work. Determinations of dielectric constants of the ore minerals gave quantitative data of great diagnostic value in overcoming the difficulties in identification resulting from opaque character. Simple methods of determining high dielectric constants and a list of the constants of many ore minerals have been determined.

Fred E. Wright and E. T. Allen: *Curtisite, a New Organic Mineral from Skaggs Springs, Sonoma County, California*. In the hot spring area of the Franciscan formation at Skaggs Springs inflammable gases are given off in small quantities at one of the vents. At this point a greenish mineral was observed by Mr. P. L. Curtis of Skaggs Springs who in turn showed it to one of us (Allen) as something unusual. On examination we found its optical properties to be unlike those of any known mineral. Its approximate chemical composition is (analyses by Dr. F. B. LaForge) $C=92.36$, $H=5.52$, $O=2.12$, which corresponds roughly to the formula $C_{60}H_{40}O$; it is soluble in hot benzol and in hot pyridine. It melts with some decomposition above 350°C; it sublimes when heated in an open tube. Crystal system, probably orthorhombic; cleavage, (001) perfect, (100) poor. Color, yellow to greenish yellow; pleochroic, γ=yellow, β=yellow, α=pale yellow to nearly colorless; absorption, $\gamma>\beta>\alpha$; refractive indices for sodium light: $\alpha=1.557\pm.001$, $\beta=1.734\pm.001$, $\gamma=2.07$; optic axial angle $2V=83.5°$, measured with an oil immersion objective; optical character, positive; dispersion of the optic axes slight $2V_r>2V_v$. Acute bisectrix emerges apparently normal to the cleavage plane (001); plane of optic axes normal to (100). There is a possibility that the crystal system is monoclinic and that the acute bisectrix is slightly inclined to the cleavage plane; the inclination is so slight however that it was not possible to measure it; attempts to produce etch figures on cleavage flakes were not successful. Hardness less than 2. Specific gravity at 21°C=1.21. Fluorescent in ultra violet light in pale bluish green tints.

Paul F. Kerr: *Strain Structure in Quartz from Ducktown, Tennessee*. A brief description of peculiar strain structure developed in massive quartz found at Ducktown, Tennessee, together with a discussion of explanations for such a phenomenon.

N. L. Bowen and G. W. Morey: *Crystalline Compounds in the System Sodium Metasilicate-Calcium Metasilicate-Silica*. Attention was called to the compounds that have been encountered in a study of equilibrium in melts of the system. Among them is the compound, $Na_2O.3CaO.6SiO_2$, which may form in many commercial glasses at low temperatures and whose bearing on rivaite of Zambonini and reaumurite of Lacroix were discussed.

Ralph W. G. Wyckoff: *The Structure of High Temperature Quartz and the Possible Nature of Silicates*. The atomic arrangement in crystals of high temperature quartz has been deduced from powder and Laue photographic data. This

atomic arrangement is that of the enantiomorphic pair 6D-4 (c, j) and 6D-5 (d, i). The unit hexagonal cell contains three molecules of SiO_2 and has the dimensions $a_0=5.01$, $c_0=5.47$Å. In this structure each silicon atom is surrounded by a tetrahedron of oxygen atoms, and each oxygen atom is equally distant from two silicon atoms. There is no evidence for the existence of molecular groupings in this structure. A similar distribution of oxygen with respect to silicon atoms has been found for the high temperature form of cristobalite. In the recently studied compound Na_2CaSiO_4 a tetrahedron of oxygen atoms occurs about each silicon atom but these silicate tetrahedrons are not linked together definitely throughout the crystal as was the case in the two forms of SiO_2 itself. These results suggest that two distinct types of structures may occur in silicates: in one of these groups the silicon and oxygen atoms form isolated ions; in the other, the silicon and oxygen atoms are linked together in a continuous chain extending throughout the crystal.

Ralph W. G. Wyckoff: *A Simple Model for Illustrating Crystal Structures.* Models for showing the atomic arrangements in crystals can be made by supporting glass plates upon nuts threaded on very long screws. The atomic arrangements are marked on these glass plates with paper circles of various sizes and colors. As many of these glass plates will be needed to illustrate the contents of a unit cell of the crystal as there are different kinds of atomic planes perpendicular to some chosen direction in the crystal. These models are simple to build and have the advantage that viewed from the top they show considerable perspective.

* * * *

The last paper was finished at 12:55 P.M. after which Dr. E. T. Wherry moved that the thanks of the Society be extended to the local committee, and to the President and Trustees of Yale University for their kindness and hospitality. This was seconded and unanimously adopted after which the Society adjourned. At this meeting two memorials and twenty-five scientific papers were presented; and one was read by title. This was the longest program ever given before the Society. Seventy-three fellows and members as well as additional guests and visitors attended the meeting, which was the longest in the history of the Society.

The following fellows, members and visitors registered at the meeting: H. L. Alling, Miss F. Bascom, W. S. Bayley, R. H. Beckwith, H. R. Blank, N. L. Bowen, Miss Ferga Carmichael, R. J. Colony, E. S. Dana, C. G. Doll, A. S. Eakle, G. L. English, C. R. Fettke, L. W. Fisher, W. E. Ford, W. F. Foshag, W. G. Foye, R. B. Gage, E. K. Gedney, J. L. Gillson, S. G. Gordon, C. K. Graeber, R. P. D. Graham, J. W. Greig, H. C. Ganning, A. E. Hammer, A. C. Hawkins, F. L. Hess, D. F. Hewett, A. P. Honess, W. F. Hunt, R. A. A. Johnston, P. F. Kerr, E. H. Kraus, G. F. Kunz, K. K. Landes, A. C. Lane, E. S. Larsen, L. W. Lewis, J. H. C. Martens, E. B. Mathews, H. W. McClellan, H. E. McKinstry, E. T. McKnight, L. W. McNaughton, B. L. Miller, W. J. Miller, E. S. Moore, W. E. Mumford, Charles Palache, A. L. Parsons, A. B. Peck, A. H. Phillips, H. Ries, C. S. Ross, Edward Sampson, J. F. Schairer, W. T. Schaller, D. H. Selchow, C. B. Slawson, V. G. Sleight, Miss Isabel F. Smith, W. G. Valentine, F. R. Van Horn, George Vaux, Jr., T. L. Walker, H. S. Washington, L. G. Westgate, E. T. Wherry, H. P. Whitlock, A. N. Winchell, F. E. Wright, and R. W. G. Wyckoff.

CONSTITUTION AND BY-LAWS OF THE MINERALOGICAL SOCIETY OF AMERICA*

Constitution

Article I.—Name

This Society shall be known as the Mineralogical Society of America.

Article II.—Object

The object of this Society shall be the advancement of mineralogy, crystallography, and allied sciences.

Article III.—Officers

Section 1. The officers of the Society shall be a president, a vice president, a treasurer, a secretary, and an editor, who shall be elected annually. There shall be an executive council consisting of the above officers, the retiring president, and four fellows at large, to be elected for terms of four years each.

Section 2. The council shall be empowered to elect from time to time as honorary officers or fellows of the Society persons of eminence in the field of mineralogy, or some closely allied science, who shall serve for life.

Article IV.—Membership

Section 1. The general membership of the Society shall be composed of fellows, members, and patrons. There may also be correspondents.

Section 2. Fellows shall be persons who have published results of research in mineralogy, crystallography, or allied sciences, and who upon nomination by the council shall have been duly elected to fellowship in the Society.

Section 3. Members shall be persons not fellows who are engaged or interested in mineralogy, crystallography, or allied sciences.

Section 4. Patrons shall be persons who have bestowed important favors upon the Society. Election to patronship carries with it the rights and privileges of members.

Section 5. Fellows, members, and patrons shall be entitled to vote in the transaction of the regular business of the Society. Only fellows are eligible to office in the Society.

Section 6. Correspondents shall be persons distinguished for their attainments in mineralogy, crystallography, or allied sciences and not resident in North America.

Article V.—Amendments

This constitution shall be amended when the proposed amendment is favored by four fifths of all the fellows voting upon it. A copy of the proposed amendment shall be published in the journal of the Society at least three months before the annual meeting. Voting shall be by mail ballot.

* Since the printing of the Constitution and By-Laws in *Am. Mineral.*, **6**, 43–45, 1921, several modifications have been approved by the fellowship of the Society (**9**, 57, 1924; **10**, 353–354, 1925). The publication of the amended Constitution and By-Laws at this time seemed, therefore, very desirable.—Editor.

By-Laws

Article I.—Membership

Section 1. Eligibility. Any person who has, in the opinion of the council, contributed materially to the advancement of mineralogy, crystallography, or allied sciences, shall be eligible to fellowship in the Society. Any person or corporation interested in mineralogy, crystallography, or allied sciences, shall be eligible to membership.

Section 2. Election. (*a*) *Fellows.* Nominations for fellowship must be made by two fellows according to a form to be provided by the council. One of these fellows must be personally acquainted with the nominee and his qualifications. The council will submit the nominations received by them, if approved, to a vote of the fellows in the manner provided in the By-Laws. The result may be announced at any stated meeting, after which notice shall be sent to the elected. (*b*) *Members.* Nominations for membership must be made on blanks provided by the council, and receive the endorsement of the secretary and treasurer of the society.

Section 3. Termination. Membership in the Society may be terminated or the names of the members may be placed upon the inactive list by vote of the council.

Article II.—Dues

Section 1. No person shall be accepted as a fellow of the Mineralogical Society of America unless he pays the dues for the year within three months after notification of his election. The annual dues for fellows shall be five dollars ($5), payable at or before the annual meeting in advance.

Section 2. The annual dues for members shall be three dollars ($3). No person shall be accepted as a member unless he pays the dues for the year within three months after notification of his election. The annual dues shall be payable at or before the annual meeting in advance.

Section 3. An arrearage in payment of annual dues of four months shall deprive a fellow or member of the privilege of taking part in the management of the Society and of receiving the publications of the Society. An arrearage continuing over two (2) years shall be construed as notification of withdrawal.

Section 4. A single prepayment of one hundred dollars ($100) shall be accepted as commutation for life for either fellows or members. In the case of fellows, who are also fellows of the Geological Society of America, a single prepayment of fifty dollars ($50) shall be accepted as commutation for life.

Section 5. Any person eligible under Article IV of the Constitution may be elected patron upon the payment of one thousand dollars ($1000) to the Society.

Article III.—Duties of Officers

Section 1. Officers. The duties of the president, vice president, treasurer, secretary, and editor of the Society shall be the usual ones performed by such officers.

Section 2. Executive Council. The executive council shall direct all affairs and activities of the Society not otherwise provided for by the Constitution, as well as perform those duties specifically assigned to it.

Section 3. Committees. The president shall appoint, with the approval of the council, such committees as may further the objects of the Society, including

a board of associate editors. The treasurer, the secretary, the editor, and the chairmen of the various committees shall make formal reports to the Society at least once each year.

Article IV.—Election of Officers and Fellows

Section I. Nominations for office shall be made by the council. The list shall be published in the journal of the Society at least three months before the annual meeting. Any ten (10) fellows or members may forward to the secretary other nominations for any or all offices. All such nominations reaching the secretary not later than November 1 shall be printed, together with the names of the nominators as special ballots. The regular and special ballots shall then be mailed to the general membership. The results shall be announced at the annual meeting, and the officers thus elected shall enter upon duty at the adjournment of the meeting.

Section 2. The list of nominations for fellowship in the Society shall be sent to the fellows at the same time as the nominations for officers. Five opposing votes shall be considered as rendering a candidate ineligible for fellowship.

Article V.—Publications

The Society shall publish a journal devoted to the advancement of mineralogy, crystallography, and allied sciences. The general membership of the Society shall be entitled to receive the journal.

Article VI.—Affiliation with other Scientific Organizations

The council shall have authority to arrange for affiliation with other scientific organizations and, as occasion may arise, to appoint fellows to represent the Society on the councils of such organizations. In the case of the Geology Society of America, the representative so appointed shall also be a fellow of the Geological Society of America, and shall be recommended to the council of said society for confirmation as one of its nominees for the vice presidency.

Article VII.—Local Sections

Local sections of the Society may be formed in any locality, with the advice and consent of the council, for the purpose of holding meetings and promoting coöperation. The affairs of such local sections shall be entirely in their own hands.

Article VIII.—Meetings

There shall be an annual meeting of the Society and such other meetings as may be called by the council. The annual meeting shall be held, whenever practicable, at the same time and place as that of the Geological Society of America.

Article IX.—Revision of the By-Laws

After recommendation by the council, By-Laws may be enacted, amended, or suspended by a two-thirds vote, by ballot, of the general membership of the Society.

PROCEEDINGS OF SOCIETIES

NEW YORK MINERALOGICAL CLUB

Regular Monthly Meeting of November 18, 1925

A regular monthly meeting of the New York Mineralogical Club was held in the East Assembly Room of the American Museum of Natural History on the evening of November 18, 1925. The President, Dr. George F. Kunz, presided and there was an attendance of 35 members.

The committee on membership reported favorably on the names submitted for membership at the October meeting. It was voted that the recording secretary cast one ballot for the election of these gentlemen. They were declared elected.

The following names were submitted to the membership committee: Dr. B. T. Butler, College of the City of New York, New York City; Mr. James Morton, Paterson Free Public Library, Paterson, New Jersey; Mr. George Carpenter, 210 West 7th St., New York City.

The committee on the resolutions regarding the death of Mr. William G. Rothe asked for more time to prepare their communication.

Captain Miller invited the Club to attend the meeting of the Newark Mineralogical Society on Sunday, December 6th when Dr. M. Twitchell, Assistant State Geologist of New Jersey would speak on the Geological Story of New Jersey.

The election day committee reported that the election day field excursion to the West Paterson quarries was attended by about 12 club members. The club extended a vote of thanks to the owners of the quarry for their courtesy in opening their quarry to the club on this occasion.

The President then introduced the speaker of the evening, Mr. Samuel G. Gordon, who addressed the Club on "*Mineral Collecting in the Bolivian Andes.*" Mr. Gordon described the expedition which was sent out by the Philadelphia Academy of Sciences, and which was known as the Third Vaux Academy Expedition. He left New York in February 1925 for the west coast of South America, visiting many of the famous mineral localities in Bolivia and Chile. The account of his journey, which he illustrated by some unusual lantern slides, included the tin mines at Llallagua, Bolivia, where he obtained cassiterite in beautiful specimens, bismuthinite, wavellite, paravauxite and strikingly beautiful vivianite. He also visited Colquechaca—where penrosite a new nickel copper-lead selenide was obtained—Oruro, Las Pas and Potosi. At the Araca tin mine beautiful clear cassiterite was obtained, and at Tarapaca, Chile, the new mineral trudellite. Mr. Gordon described in a most interesting manner his experiences in collecting from the underground workings and the incidents connected with his journeys which were often highly adventurous.

At the close of his address a vote of thanks was tendered to the speaker for his most interesting and valuable account.

Herbert P. Whitlock, *Recording Secretary*

Regular Monthly Meeting of December 16, 1925

A regular monthly meeting of the New York Mineralogical Club was held in the East Assembly Room of the American Museum of Natural History on the

evening of December 16, 1925. The Vice President, Mr. George E. Ashby, presided, and there was an attendance of 20 members.

The committee on membership reported favorably on the names submitted for membership at the November meeting, and added to them the name of Mr. H. Julian Knox, of William Wise & Son, Inc., 10 Flatbush Avenue, Brooklyn, New York. The Recording Secretary was instructed to cast a ballot for these names: Dr. B. T. Butler, Mr. James Morton, Mr. George Carpenter, and Mr. H. Julian Knox who were declared elected to membership.

The committee on the resolutions regarding the death of Mr. William G. Rothe, submitted the following communication:

> The New York Mineralogical Club spreads on its records and conveys to the family of the late Wm. G. Rothe the following appreciation.
>
> Mr. Rothe was one of the original members of this Club, having associated himself with it in 1887. He retained his membership during thirty-eight years until his death June 26, 1925, in his eighty-seventh year.
>
> Mr. Rothe was born in Germany, and came to New York City while an infant. After a period in Newark he moved to Brooklyn in 1868 and associated himself with E. R. Squibb & Son of which company he was Treasurer when he retired in 1907.
>
> His interest in minerals dated from his early years. He was a discriminating and tireless collector, sparing neither time nor money to get noteworthy specimens. He attended the collection trips and meetings of the Club regularly during its earlier years, and was also active in the Mineralogical Dept. of the Brooklyn Institute of which he was President for several years.
>
> His extensive and notable collection was well displayed in an entire room at his home and personified Mr. Rothe's ambition toward perfection. Then in late life he disposed of his collection, many gladly profited at the opportunity to obtain specimens of his high standard. The older members of the Club who knew him marveled at his enthusiastic interest in mineralogy, admired his collection, valued his friendship, and emulated his example of painstaking care, thoroughness and dependability.
>
> This Club loses a member who linked us with its birth, and did it credit both as a mineralogist and a man.
>
> Signed for the Club:
> GILMAN S. STANTON,
> GEORGE E. ASHBY,
> JOHN A. GRENZIG.
> *The Committee*
>
> New York, N. Y.,
> December 16, 1925.

Capt. Miller reported that addressograph plates can be supplied for about 4½ cents apiece. Mr. Stanton moved that the treasurer be authorized to order the addressograph plates and that they be placed in the custody of the recording secretary. Capt. Miller invited the members of the Club to the meeting of the Newark Mineralogical Club on the first Sunday in January on which occasion Mr. Radu and Mr. Lee would speak on Gem Minerals.

Mr. Whitlock addressed the Club on the subject of "*Symmetry, an Old Law of Crystallization in the Light of New Research.*" The speaker emphasized and coördinated popular ideas regarding symmetry by the use of a novel device of rotating disks (symmetry targets). He passed from the consideration of two dimensional symmetry to symmetry in three dimensions and to the close packed particle arrangement of beads or balls, pointing out the relation of this to several symmetrical aspects. In conclusion he discussed several atomic structures in the light of physical properties.

In discussion Dr. Allen cited the crystallization of manganosite, which has been considered cubic-holohedral, and stated that he had noted twinned tetrahedrons among its crystals. He also stated that he had noted the same on crystals of uraninite. Mr. Hoadley took issue that the octahedral (111) plane was the only possible twin position in the isometric system.

HERBERT P. WHITLOCK, *Recording Secretary*

PHILADELPHIA MINERALOGICAL SOCIETY

Academy of Natural Sciences of Philadelphia, Jan. 14, 1926

A stated meeting of the Philadelphia Mineralogical Society was held on the above date, with the president, Mr. Vaux, in the chair. Thirty-two members and nine visitors were present.

Mr. R. B. Gage, of Trenton, N. J., was elected to membership, and Mr. Ellis Stineman, of Philadelphia, to junior membership.

An amendment to the by-laws was proposed, changing the meeting-night of the society from the second Thursday to the first Thursday of each month. It will be acted upon at the next meeting.

Dr. Benjamin L. Miller, of Lehigh University, Bethlehem, Pa., then addressed the society on "*Economic Minerals of the Limestones of Pennsylvania.*" The limestones of Pennsylvania vary greatly both in character and composition, and are very widely distributed over the state. The greatest differences exist between the deposits east of the Allegheny front, where the rocks have been greatly folded and often metamorphosed, and those in the western half of the state, where the strata are nearly horizontal and have been very little disturbed.

In Pennsylvania the limestones are second only to coal among mineral products of economic importance. At the present time they are being studied more intensively from this standpoint than ever before. The cement industry is searching for limestone of high calcium carbonate content, the steel industry for low silica dolomites, and the magnesia industry for dolomites high in magnesium carbonate.

A number of mineral products of economic importance have resulted from the secondary changes to which the Pennsylvania limestones have been subjected. Changes due to regional metamorphism have produced marble and graphite, but with reference to both of these materials the Pennsylvania industry has succumbed to outside competition. Contact metamorphism has been responsible for the formation of the important magnetite deposits at Cornwall, French Creek, and other localities in the state. Upward moving artesian waters have concentrated lead and zinc ores into deposits in the limestones, a few of which, such as that at Friedensville, have been worked. Downard moving surface waters have caused the

formation of a very large number of limonite deposits, which were at one time the most important iron ores in the State. Some of them are still being worked for ochre and umber.

Mr. Knabe exhibited a molybdenite crystal from Morton, Pa., and Mr. Vaux displayed specimens of crystallized calcite, pyrite, magnetite, and apophyllite from the French Creek Mines.

The meeting adjourned with a rising vote of thanks to Dr. Miller for his interesting address.

HORACE R. BLANK, *Secretary*

YALE MINERALOGICAL SOCIETY

During the academic year 1924–25 five regular meetings were held.

On October 21, 1924, the first meeting was held. The following officers were elected.

President: J. F. Schairer
Secretary: C. C. Lawson
Asst. Secretary: Donald Selchow
Treasurer: S. A. Northrup

An examination of specimens from the Connecticut pegmatites and discussion followed.

On January 13, 1925, Professor B. B. Boltwood of the Chemistry department gave a paper on "Radioactive Minerals." A long discussion followed.

At the next meeting on February 18, 1925, Dr. John Johnston, Director of the Sterling Chemistry Laboratory gave a lecture on "The Application of Physical Chemistry to Mineralogy and Geology." A discussion and business meeting followed.

On March 24, 1925, Dr. E. T. Wherry spoke on "Volume Isomorphism in Minerals." The lecture was illustrated by slides. A long discussion by members from the chemistry department working along this line followed.

At the meeting of May 5, 1925, Dr. W. M. Agar described the "Mineralogy of Northern New York." He illustrated his lecture with a large suite of specimens.

Four mineral excursions to the pegmatite localities in Connecticut were conducted under the auspices of the society.

The secretary reported thirty-five active members on June 1, 1925.

J. F. SCHAIRER, *President*

NOTES AND NEWS

On invitation of the Department of Geology and Mineralogy of the University of Wisconsin, the next annual meeting of the Mineralogical Society of America will be held at Madison, Wisconsin, in conjunction with that of the Geological Society of America and other affiliated societies. The exact date has not been determined but will be on or about December 28.

Several members of the Mineralogical Society, including the president, stopped over in Trenton, New Jersey, on the way to or from New Haven and visited Colonel Washington A. Roebling. He is actively engaged increasing his remarkable mineral

collection and was able to show his visitors a number of species described within the last year or so, as well as magnificent specimens of well known minerals.

Dr. George F. Kunz has obtained what is reported to be the first sample of synthetic gold which has reached this country. It will form a part of the collection of elements at the American Museum of Natural History in New York. The sample of synthetic gold comes from the laboratory of Professor Hantaro Nagaoka of the Tokyo Imperial University. Dr. Kunz has also in his collection the first crystals of pure fluoride of hafnium and metallic hafnium, but does not have samples of the two new elements rhenium and masurium.

The Nichols medal in chemistry for 1925 has been awarded by the New York section of the American Chemical Society to Dr. S. C. Lind of the U. S. Fixed Nitrogen Research Laboratory, Washington, for his work on "The Chemical Activation of Alpha Particles."

Attention is called to the coming International Geological Congress to be held in Madrid, May 24 to May 31. Excursions are arranged to take place before, during, and after the Congress, the first one starting May 5. Participation in the excursions is reserved to official delegates of the different nations, geologists, geographers, mining engineers and all persons engaged in the study or application of any branch of geology.

Dr. Frederick B. Peck, professor of mineralogy and geology at Lafayette College, died on November 9 of heart disease. Professor Peck has been connected with Lafayette College since 1892 and was in his sixty-fifth year. A biographical sketch of his life appears in this issue.

Dr. Albert O. Hayes, of Ottawa, Canada, has been appointed visiting professor for the second term at Lafayette College to fill the vacancy in the department of geology, created by the death of the late Professor Peck.

Professor W. Killian, professor of geology and mineralogy in the University of Grenoble and member of the Paris Academy of Science, has died, aged sixty-three years.

M. Gignoux, professor of geology at the University of Strassburg, has been appointed professor of geology and mineralogy at the University of Grenoble to take the place of the late Professor Kilian.

According to *Science Service* the missing chemical element No. 75 has been discovered by Dr. J. Heyrovsky, professor of physical chemistry at Charles University, Prague, and Dr. Doleysek of the Prague Academy of Sciences. The element has been named bohemium, in honor of Bohemia, and was discovered as an impurity in magnesium. The discovery of this same element 75, also element number 43, is likewise claimed by Prof. Walter Naddack of the University of Berlin, working with Otto Berg and Ida Tacke. They selected the names rhenium and masurium, for 75 and 43, respectively, in honor of regions lost by Germany as a result of the war. Only three missing chemical elements now remain to be discovered, numbers 61, 85 and 87.

NEW MINERALS: DOUBTFUL SPECIES

CLASS: SULFIDES, ETC.

"Modderite"

R. A. Cooper: Mineral constituents of Rand concentrates. *Jour. Chem. Met Soc. S. Africa*, **24**, 90 (1923) and **24**, 264 (1924).

Name: Derivation not given.

Chemical Properties: Monosulfide of cobalt, CoS. Analysis (made on a sample containing considerable niccolite, galena and platinum metals): As 23.6; Co 11.4; Ni 3.6; S 23.7; Fe 22.8; Pb 6.8; Au, Ag and Pt metals 8.1.

Physical Properties: Color bluish white.

Occurrence: Found in the concentrates of the mines of the Far East Rand, South Africa, and occurring only in minor amounts in the ore.

Discussion: A cobalt monosulfide has been described and listed in Dana as *jaipurite*. The description of "modderite" adds nothing to this very doubtful species. W.F.F.

CLASS: OXIDES

Iozite

Albert Brun: Les Iozites; Nouvelle classe de minéraux dans les laves de-volcans modernes. (Iozites: a new class of minerals in the lavas of modern vol. canoes.) *Compt. Rend. Soc. Phys. Hist. Nat. Genève*, **41**, 94–96 (1924). Also *Arch. Sci. Phys. Nat. Genève*, **6**, 244–263 (1924).

Name: From the Greek for iron rust. The general name iozites is proposed for those magnetites carrying an excess of FeO.

Chemical Composition: Thought to be the ferrous oxide of iron. Formula FeO. No analysis is given but the composition is arrived at by the reduction of the mineral by hydrogen. Qualitative tests show the mineral to be an oxide of iron with minor amounts of manganese and titanium.

Crystallographic Properties: The individual grains have square outline or appear to be octahedrons.

Physical Properties: Color black. Magnetic.

Occurrence: Found as swarms of minute black granules around trichites of feldspar and pyroxene in basaltic or trachytic glass. Their average size is 5–10μ. They have presumably been precipitated from the glass by the crystallization of the microlites.

Discussion: The evidence is not sufficient to substantiate this as an occurrence of natural ferrous oxide. It has not been fully demonstrated that these bodies are not magnetite. W.F.F.

CLASS: SILICATES.

Radiophyllite

Adele Brauns and R. Brauns: Ein Kalkzeolith aus der Gruppe der Glimmer-zeolithe von Schellkopf bei Brenk (Oberes Brohltal). (A line-zeolite of the mica, zeolite group from Schellkopf near Brenk (Upper Brohltal). *Centr. Mineral. Geol.* 549 (1924).

Name: In reference to its arrangement in radial plates.

CHEMICAL PROPERTIES: A hydrous silicate of lime. Formula: $CaSiO_3 . H_2O$. Analysis (on material carrying admixed calcite): SiO_2 33.98, Al_2O_3 2.34, CaO 43.14, CO_2 10.99, H_2O 9.48; sum 99.93.

PHYSICAL AND OPTICAL PROPERTIES: Color white, H=2–3. Sp. Gr. 2.53. Uniaxial, negative.

OCCURRENCE: Found as small, radial platy to compact masses in the cracks in noselite-phonolite from Schellkopf near Brenk associated with phillipsite, calcite and aragonite.

DISCUSSION: Since the material analyzed was so impure and since no quantitative optical properties are given the mineral must be classed as doubtful. The massive mineral suggests the very doubtful mineral tobermorite. W.F.F.

NOTES AND NEWS

While the March issue was going through the press the Editor received the good news that Colonel Washington A. Roebling of Trenton, New Jersey, had given the Society a very substantial endowment, the income of which may be used for expanding the Society's publication, THE AMERICAN MINERALOGIST.

The letter, addressed to the treasurer, accompanying this generous gift is printed herewith in full.

Feb. 15, 1926.

Alexander H. Phillips,
Treas. Mineralogical Society of America,
Princeton University,
Princeton, N. J.

Dear Sir:

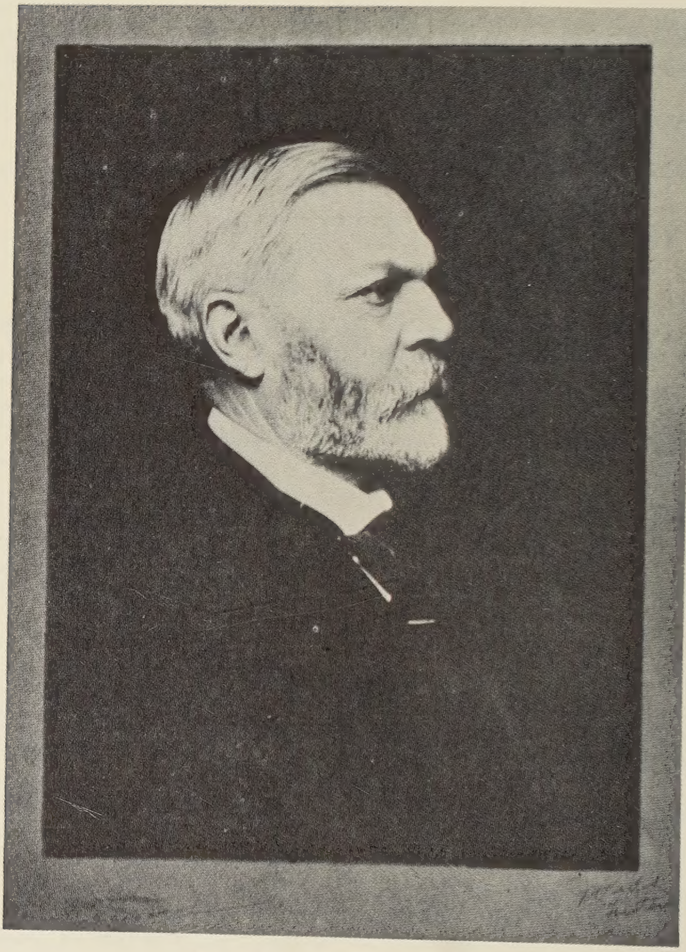
I hereby donate to the Mineralogical Society of America \$45,000 in bonds of the City and County of Honolulu, Hawaii, paying 5% per annum, due 1954. This gift is unconditional. I wish, however, that the whole or part of it be devoted to the publication of the monthly magazine THE AMERICAN MINERALOGIST, which has been conducted on too narrow a margin.

This magazine is the life of the Society. Its perusal is a pleasure to all lovers of minerals.

Sincerely yours,
(*Signed*) WASHINGTON A. ROEBLING

Witness:
(*Signed*) ROBERT B. GAGE

The Editor, in behalf of the officers and members of the Society, wishes to express to Col. Roebling his grateful appreciation for this timely gift, which will now permit THE AMERICAN MINERALOGIST to serve its constituency more adequately than has been possible in the past.



Col. Washington A. Roebling
Donor of an endowment for mineralogical publications